UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL AIR QUALITY TASK FORCE

AGRICULTURAL AIR QUALITY RESEARCH PROGRAM

1. Establish an Agricultural Air Quality Program in the Department

Previously, the Agricultural Air Quality Task Force (AAQTF) identified a critical need to adequately fund and coordinate agricultural air quality research that would provide the scientific basis for agriculture to comply with the Clean Air Act and CERCLA/EPCRA. Eight years ago, the AAQTF undertook an extensive review of research needs and issued a comprehensive report that detailed a $65 million per year USDA and EPA program. Although some funds have been re-programmed at USDA-ARS and CSREES for air quality research as a result of AAQTF recommendations, the necessary, comprehensive agricultural air quality research and policy program has not been established. With new, stricter particulate, VOC, diesel, sulfur compound, nitrogen compound, methane, and odor restrictions anticipated, a comprehensive air quality program in the USDA is urgently needed. Otherwise, agriculture, particularly in non-attainment areas, will be unable to comply.

Although they are very beneficial to agriculture, air quality research and policy programs at the USDA are fragmented among the USDA-ARS, CSREES, and NRCS. The various components consult with the AAQTF and among themselves, but better control is urgently needed to establish priorities, reduce duplication, determine program effectiveness, disseminate information, coordinate with other agencies, and communicate within USDA. Experts in agricultural air quality issues need to be recruited to staff the program and report at a level that can control air quality research in the department.

- ***The AAQTF recommends that the USDA establish an agricultural air quality program that has administrative and budget control over air quality research and policy within the department.***

- ***The AAQTF recommends that funding levels for agricultural air quality research be increased to $40,000,000 per year (2% of the USDA research budget) to establish a critical mass for the research program.***

2. Continue to Re-program USDA Research Programs to Address Immediate Agricultural Air Quality Issues.

In the 2006 fiscal year, the AAQTF recommends that existing USDA research plans continue to be evaluated and modified to include high priority agricultural air quality needs. The following

research priorities should be funded in FY 2006 and would establish the framework for expanded research and implementation through the comprehensive effort recommended above.

1. Develop $PM_{2.5}$, PM Coarse, NH_3, H_2S, Odorous, and Reactive VOC's Emission Inventories/Emission Factors/Process-Based Modeling for High-Priority, Targeted Agricultural Practices. The accurate assessment of $PM_{2.5}$, PM_{10}, NH_3, H_2S, odorous gases, and reactive VOC's associated with agricultural operations and confined animal feeding operations is a current critical issue for geographic areas such as California's San Joaquin Valley, the Midwest, and the Southeast. In the future, if non-attainment areas expand as expected, other agricultural areas, especially those proximate to urban areas, could be affected. Particulate from field operations and processing facilities is also a concern in many areas of the country where there are extensive agricultural activities. Accurate data on NH_3, H_2S, and odor emissions from animal operations is urgently needed. Reactive VOC's are being targeted in ozone non-attainment areas and emissions from production operations and animal operations must be accurately characterized. Science and engineering-based protocols must be established for developing emission factors and process-based modeling protocols for certain applications. Agricultural practices must be identified and addressed with science-based solutions. If good emission factors and process-based modeling protocols are not developed soon, regulators will be required to use default values and emissions determinations that may be too high or too low.

2. Establish the Appropriateness of Utilizing PM Samplers Designed for Urban Environments in a Rural Setting. Coarse PM emitted in the rural environment whether by agricultural operations or natural sources is typically larger than PM_{10} measured in an urban setting by the PM_{10} Federal Reference Method (FRM) sampler. Likewise, bias is also evident in the $PM_{2.5}$ FRM sampler. Under certain instances, the samplers can over-sample in agricultural, mining, and construction settings. It is therefore important to understand both the concentration at a sampling site and the distribution of particle size. An effort to determine this relationship is critical to understanding the impact of agricultural practices on air quality. The development of appropriate monitoring protocols and sampler performance criteria is necessary to ensure that agriculture is not disproportionately affected by new regulatory initiatives.

   Furthermore, EPA is proposing to change the National Ambient Air Quality Standard (NAAQS) for particulate. It is expected that the $PM_{2.5}$ NAAQS will be set lower and a new $PM_{10-2.5}$ NAAQS might be established. This could have significant implications for agricultural because of the experience with the FRM samplers in rural settings.

3. Develop Accurate Dispersion Models. Dispersion modeling is used to ensure that the primary (human health) and secondary (i.e. environment, forests, etc) impacts associated

with air pollutants may be determined accurately. It is extremely important that modeling software that is currently being used be evaluated for agricultural environments to determine both appropriateness and accuracy, and when necessary new or modified dispersion models that reflect downwind concentration be developed. Emphasis should be placed on processed-based modeling for certain applications.

4. Develop Management Plans and Control Technologies. Agricultural operations and processes vary significantly across the country because of different crops, farming practices, weather and climate, soil types, land use restrictions. Generic management plans and control technologies cannot be applied to agriculture if effective emissions control is desired. This makes the development of management plans and control measures complex and expensive. Furthermore, the scientific and engineering infrastructure to develop measures based on sound science and engineering is basically limited to a few land-grant universities and a small contingent at the USDA ARS. Funding is essential to improve and support this agricultural air quality research infrastructure so that high priority, targeted work can begin and continue. Otherwise, we will not have the technical critical mass available to respond to the burgeoning needs of agriculture.

5. Evaluate the Impact of New Diesel Rules on Agricultural Operations. New diesel rules require a significant reduction in sulfur content in diesel fuel and require major modifications in engines to comply with Tier IV requirements. New agricultural engines already comply with Tier III requirements and this reduces emissions by over ninety percent. Tier IV poses significant modification challenges for agricultural equipment and may cause fire hazards for certain equipment. The inventory of emissions from agricultural, non-road diesel, engines need to be improved. The impacts of the diesel rules on older engines and new Tier IV engines needs to be more completely evaluated with agricultural applications in mind. Technical and policy solutions to the reductions of diesel emissions from agricultural, non-road, engines need to be researched.

6. Evaluate Agricultural Contributions to National Air Quality Initiatives. Agricultural contributions to major national air quality and energy issues can be significant and may offer opportunities for agriculture. Ethanol, methane, and biodiesel production will provide a significant contribution in a new energy bill, now in Congress. More research leading to a better understanding of the inventory of methane and nitrogen compounds from agriculture is needed. Furthermore, the implications of a program for carbon sequestration and green house gas credits for offset of methane and nitrous oxide emissions need to be better understood.

7. Assess the Role of Agricultural NH_3 Emissions in the Formation of Ammonium Nitrate Particulate Matter. There is growing evidence that NH_3 is the principal cause of a

recently identified regional-scale ammonium nitrate dominated high particulate concentration in the Midwest and Central Great Plains during the winter. Increasing ammonium nitrate concentrations over a broader region may be the unintended result of planned, future reduced industrial SO_2 emissions that increase the availability of un-reacted atmospheric NH_3. USDA needs to promote research to better understand the agricultural contributions of NH_3 and the implications on production agriculture.

8. Evaluate Pathogens and Other Constituents from AFO/CAFOs. Health organizations, environmental groups, and residents living near some AFO/CAFOs have expressed concerns that pathogens and other constituents including antibiotics might be transported beyond the farm boundary. USDA-ARS and CSREES have a research program underway that is investigating pathogens and continued research on the fate, transport, and potential impact of pathogens and other constituents is warranted.

Specific agricultural operations and processes that should be prioritized for emissions sampling, characterization, modeling and management plan research are listed below:

- Animal feeding operations
- Agricultural burning
- Agricultural processing facilities
- Off-road/stationary engines
- Field and crop operations

Approved by the Agricultural Air Quality Task Force on June 23, 2005.